the pre-adjustment stage. Another way is by partial closing of the shutters in the
final-adjustment stage.

Claims

5   Claim 1

Apparatus for frequency adjustment of piezoelectric resonators by ion etching
in a
vacuum chamber, comprising

-a tray holding multiple resonators in a matrix pattern of columns and
10   rows,

-facing the tray, an ion gun having a race-track shaped beam pattern,
including two straight-track portions,

-means for aligning two rows of resonators with the two straight-track
portions of the ion beam, and for stepping the tray to the next two rows of resonators,
15   -means for controlling the ion flow to the resonators,

-instrumentation for monitoring the frequency of the exposed
resonators and for cutting off the ion flow when the resonator frequencies reach
predetermined target values.

20   Claim 2

Apparatus according to Claim 1, wherein

- the distance between the two straight-track portions of the racetrack
pattern is a multiple of the distance between two adjacent rows of the tray,

- the ion flow is controlled by two rows of shutters positioned between
25   the resonators and the two straight-track portions of the ion gun.

Claim 3

Apparatus according to Claim 1, wherein the ion flow to one of the rows of
resonators is smaller than to the other.

Claim 4

Apparatus according to Claim 3, wherein the unequal ion flow is obtained by partial closing of one of the rows of shutters.

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Claim 5

Method for frequency adjustment of piezoelectric resonators by ion etching in a

vacuum chamber, based on

10   holding the resonators in a tray of columns and rows,

            facing the resonators with an ion gun having a race-track shaped beam pattern including two straight-track beam portions,

            aligning two rows of resonators with the two straight-track portions of the ion beam,

15   controlling the ion flow to the resonators,

            monitoring the frequency of the exposed resonators and cutting off the ion flow when the resonators reach predetermined target values,

            stepping the tray to the next row of resonators and repeating the adjustment process.

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Claim 6

Method according to Claim 5, based on controlling the ion flow by means of shutters.

Claim 7

25   Method according to Claim 5, based on making the ion flow to one of the rows of resonators smaller than to the other.

Claim 8

Method according to Claim 7, based on reducing the ion flow to one of the rows of resonators by partially closing the interposed row of shutters.